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INVESTIGATION OF HEAVY METALS FROM SOME ALIMENTARY PRODUCTS

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ABSTRACT

The presence in high amount of organic pollutants and heavy metals in environment represents a potential danger for human health and for environment too. This work presents aspects regarding the pollution with heavy metals (Cd, Pb, Cu and Zn) of some food products: caw milk, caw cheese and caw meat. The samples analysed were collected from some housekeeping of Lumina (Constanta). The heavy metals were analysed using atomic absorption spectrometry.

INTRODUCTION

The heavy metals are very toxic for life, even in small quantities. The increasing of metal concentration in food over the limits can cause toxic effects for consumers of these products. The gravity of toxic effect depends on nature, metal concentration, body resistance and presence of other contaminants. Heavy metals' toxicity is the result of their interaction with the enzymatic systems from the animal cells or some constituents of cells' membranes /1, 2/.

Many environmental chemicals are known to affect the human life. Thus, the heavy metals and organic pollutants concentration in soil and water is very important due to their toxic effect in food, through the biologic chains: soil-plant-food /1/. For this reason, accurate monitoring of their concentration plays an important role. Population can be contaminated with organic pollutants and heavy metals by ingestion of contaminated or polluted food and water. Concentration of this elements in food products is varied, depending of their origin, storage conditions and processing technologies.

This work presents aspects regarding the pollution with heavy metals (Cd, Pb, Cu and Zn) of some food products collected from housekeeping of Lumina (Constanta): caw milk, caw cheese and caw meat.

MATERIALS AND METHODS

The food samples (milk, cheese and meat) were collected from housekeeping of Lumina (Constanta), during August 2013.

For to analysed the heavy metals concentrations, the cheese and meat samples were hashed, dried at 105 ^{0}C and mineralized by wet digestion method (HNO_3 - H_2SO_4). About 0.5g of each dried sample was predigested in 2 mL 65% HNO_3 for 24 hours at room temperature, then 2 mL of 98% H_2SO_4 were added and the mixture was digested in a VELP DK6 heating digester. We have also analysed the heavy metals from milk samples. The milk samples were vaporised and after cooling, the residue was mineralized too by wet digestion method. All used reagents were of analytical reagent grade (Merck). The resultant solutions were analysed with an atomic absorption spectrophotometer GBC-AVANTA (air / acetylene flame) for to determine the heavy metals concentration: Cd (λ =

228.8 nm), Cu (λ = 324.7 nm), Zn (λ = 213.9 nm) and Pb (λ = 217 nm). Two replicate determinations were done for each solution.

RESULTS AND DISCUTIONS

The heavy metals concentrations in the samples analysed were compared with the maximum limit allowed for each food product (Table 1):

Table 1

Maximum limits allowed in some food products (mg/kg) /11/

Food product	Cd	Pb	Zn	Cu
milk	0.01	0.1	5	0.5
cheese	0.05	0.5	25	2.5
meat	0.1	0.5	50	3

All the results obtained are average values of experimental data (Table 2):

Table 2

Maximum limits allowed in food sample analysed (mg/kg)

Food product	Cd	Pb	Zn	Cu
caw milk	0.004	0.091	3.56	0.42
caw cheese	0.008	0.64	33.46	3.12
caw meat	0.07	0.57	38.82	1.45

The results presented in table 2 showed smaller amount of Pb in cheese and meat over the limits and bigger concentrations for Zn and Cu in cheese. We remark that the milk correspond to consumer's requirements.

CONCLUSIONS

Heavy metals may reach food from different sources: soil, water, chemicals applied to agricultural land, contaminating dirt, equipment used for food processing, storage and cooking.

The analysis performed showed that the milk collected from housekeeping correspond to consumer's requirements but not and the cheese and meat samples. In cheese samples the concentrations of Pb, Zn and Cu exceeded the maximum allowed limits and in meat samples only the concentration of Pb exceeded the limit because of an improper processing.

REFERENCES

1.Khansari F.E., Khansari M.G., Abdollahi M., Heavy metals content of canned tuna fish. *Food Chemistry*; 93: 293-296, 2005.

2. Türkmen A., Türkmen M., Tepe Y., Akyurt I., Heavy metals in three commercially valuable fish species from Iskenderun Bay, Northern East Mediterranean Sea, Turkey. *Food Chemistry*; 91:167-172, 2005.

3. Edwards J.W., Edyvane K.S., Boxall V.A., Hamann M., Soole K.L., Metal levels in seston and marine fish flesh near industrial and metropolitan centres in South Australia. *Marine Pollution Bulletin*; 42(5):389-396, 2001.

4. Clesceri L. S., Standard methods for the examination of water and waste water. In *Collection and Preservation of Samples and Metals* (eds Arnold, E., Greenbergy and Eaton, A. D.), APHA, AWWA, WEF, Washington, DC; 1:27-35, 3:1-21, 1998.

5.Mititelu M., Mihele D., Criveanu D., Heavy metals investigation from some food products using atomic absorbtion spectrometry, *Farmacia*, 6, 2006.
6. Adriano D.C.,*Trace elements in terrestrial environment*, Springer Verlag, New York Inc., 1986.
7. * *National Research Council of Canada*,** 15017, 168, 1976.
8. Kalac P., Niznamska M. et al.,*Sci. Total Environ.*, 177, 251, 1996.
9. Nusko R., Fresenius J. *Anal. Chem,* 357, 1050, 1997.
10. Bordera L.,Fresenius J. *Anal. Chem.,* 355, 112, 1996.
11. Banu C., Preda N., Vasu S.S.,*Food products and their toxicity,* Technical Publishing House, Bucharest, 1985.